MAKER EDUCATION: A FIT FOR HUMANITIES EDUCATION IN THE 21st CENTURY

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ABSTRACT

Makerspaces, physical spaces containing a variety of tools and materials for creating and sharing hands-on projects, have appeared all around the world in both public spaces and private corporations. Makerspaces have been found so beneficial for student development in the STEAM (Science, Technology, Engineering, Arts, and Mathematics) fields that an educational approach, maker education, has been developed based on maker principles. Maker education classes involve not only creating physical artifacts, but high-level communication, collaboration, critical thinking and problem-solving skills. This method seems to fit perfectly within the humanities umbrella, but is rarely if ever applied in this area (Peppler et. al, 2015, p. 4). This paper explores the rationale for adapting maker education to fit within the context of humanities-focused tertiary education and explores the potential benefits.

INTRODUCTION

New Skills

Rapid technological developments are marking exponential growth and change to society (Hatch, 2017, p. 20). This exponential change, already underway, has strong implications for the future of education. Educational reform is being carried out to ensure that young people are prepared to enter a society markedly different from the society that engineered the current educational system. The nebulous nature of the future is indicative of the problem facing educators: How can we prepare students for an undefined future? Wagner (2014) asserts that students must develop new skills in order to bridge the global achievement gap (p.3). Michal Resnik, a pioneer in educational reform, argues that education should cultivate *X* students, or learners able to adapt to an utterly unpredictable future (Resnik, 2017, p.2). The Partnership for 21st Century Learning (P21) identified the most important skills for future learners as critical thinking, communication, collaboration, and creativity (Trilling & Fadel, 2009). These skills, collectively known as the 21st century skills, are a focus of new educational reform. Nowhere is this more strongly evident than in the advances in the STEAM (Science, Technology, Engineering, Arts/Design, and Mathematics) fields. The transformation in these fields has led to educational materials that are tailored to the learner and focus on developing 21st century skills (Rotterham & Willingham, 2010).

Maker Education

In conjunction with this global shift in educational practice, makerspaces have appeared all around the world in public libraries, schools, and private companies. Makerspaces are physical spaces containing tools and materials for creating physical artifacts and sharing them with a passionate community.

Maker principles have found a niche in STEAM curricula, as they are a natural way for exploring concepts and gaining knowledge or experience in those related fields (Peppler, Maltese, Keune, Chang, & Regalla, 2015). For example, if you want to teach students how electric current works, have them build electrical circuits. Skills learned in a maker environment are also a natural fit for any field looking to adapt to the needs of the changing 21st century society. Makerspaces have been found so beneficial for student development that they have led to an educational approach, maker education. Maker education, now a key player in innovation to STEAM education, involves students in creating different hands-on projects (Clapp, Ross, Ryan, & Tishman, 2016). Maker education is fundamentally connected to *constructionist* principles (Harel and Papert, 1991), which are characterized as the "application of *constructivist* to a hands-on learning environment" (Kurti, Kurti, & Fleming, 2014, p. 8). Maker education employs *constructionist* educational principles through hands-on collaborative projects to contribute to learner skill development.

However, maker education has not made significant inroads into humanities or social sciences outside of primary school settings. Maker education is rarely if ever associated with the areas of study such as languages, peacemaking, international communication, and international business skills (Peppler et. al, 2015, p. 4). On the other hand, even in these often-excluded fields, the skills developed in makerspaces are extremely beneficial in modern society and would benefit these areas of study. It is helpful to remember that paradigms such as 21st century skills have been developed to focus on skills all learners will need to function in an uncertain future. The skill set is not limited to fields that are typically associated with high technology such as engineering or software development.

MAKER SKILLS FOR HUMANITIES EDUCATION

Collaboration and communication

Makerspaces and maker education are effective in large part as a result of the social nature of creating an artifact. Obviously, the creation of something can take place in solitude, but to do so would ignore a wealth of knowledge and experience available from other makers. Parallels may be drawn to the development process of new technologies where "the challenges are simply too complex for any single individual to create the solution" (Kurti, Kurti, & Fleming, 2014). Creation of something new can be done individually, but the best projects are created through an iterative process involving input and feedback from a wide variety of people. One of the fundamental principles of the maker movement is sharing. This is evident in both makerspaces, maker education classrooms, and maker faires, where

strong emphasis is placed on sharing and collaborating with others. Gauntlett (2018) remarks that "through making…we increase our engagement and connection with our social and physical environments" (p.10); a connection that allows for the application and development of communicative and collaborative skills. The process of creating an artifact involves sharing ideas, solving problems, getting feedback, and presenting to others.

In addition, maker education shifts the model of student interaction from competition to collaboration within a supportive environment where the knowledge and skills of all are multiplied. Richmond (1993) remarks that "students must also learn to cooperate with each other as learning partners rather than view fellow students as competitors in a zero-sum game" (p. 116). In part, this is pushed forward due to the absence of a teacher as an authority figure; teachers generally take on the role of facilitators or advisors who are not the source of all knowledge. This pushes students to rely on the knowledge of their peers or seek advice from the vibrant online community of makers. Maker education is a practical way of allowing students to naturally develop communication and collaboration skills.

Critical thinking and problem solving

One of the great challenges of the information age is facing mountains of information and knowing how to filter and process it into something meaningful. The prevalence of fake news, native advertising, and misleading social media highlights the dangers of passive media consumption. Critical thinking is often championed as the filter that helps us safely navigate the new digital landscape. "Critical thinking refers to the use of cognitive skills or strategies that increase the probability of a desirable outcome" (Halpern, p. 70). According to this definition, we reach a desirable outcome or goal though the process of applying cognitive skills and strategies to the information surrounding us. Humanities and social sciences are heavily invested in the process of interpreting information, as it to some degree determines the reality of our social interactions. Maker projects are ideal for promoting critical thinking, as they first establish a "desirable outcome" or goal, which is pursued by applying *known* principles and learning *new* principles that increase the probability of reaching the objective. Maker education encourages students to ask questions, experiment, and develop creative, unique solutions (Kerti, Kerti, & Fleming, 2014, p.10). This environment leads to natural development of the skills necessary to approach a problem and seek solutions.

CONCLUSION

Maker projects and lessons provide a learner focused way of exploring the world and gaining knowledge. Many would argue that one of the primary goals in education is to jumpstart a process of lifelong self-regulated learning. Maker education provides space, tools, and social opportunities that allow learners to grow and develop skills necessary to succeed in today's world. These skills may be applied in far more contexts than science technology, engineering, and mathematics; they are important for innovation and success in any field. Recently, maker education has begun to expand its influence into fields

traditionally disparate from the STEM umbrella. In the future, this will only continue to increase as demand for innovate approaches are necessary to solve the problems of tomorrow. Applying maker education in new contexts such as the social sciences will help us anticipate this future.

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